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Targeted Screening for Childhood Lead Exposure in a Low Prevalence Area — Salt Lake County, Utah, 1995–1996

During 1991–1994, an estimated 930,000 U.S. children aged <6 years had blood lead levels (BLLs) ≥10 µg/dL, and the risk for an elevated BLL was greatest among children who were non-Hispanic black or Mexican American, from low-income families, living in large metropolitan areas, or living in housing built before 1946 (*1*). Because risk for lead exposure is associated with several different factors, it can vary greatly across relatively small areas. To establish the local prevalence and distribution of childhood lead exposure and develop local blood lead screening recommendations, the Salt Lake City-County Health Department (SLCCHD) offered free blood lead screening to all children aged 12–36 months enrolled at the seven Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) clinics in Salt Lake County, Utah (1995 population: 812,000), during January–October 1995. This report presents findings of the screenings at WIC clinics, describes the design and promotion of local targeted screening recommendations, and describes the resulting increases in appropriate BLL screenings among children.

WIC Prevalence Survey

The seven WIC clinics are dispersed throughout Salt Lake County. Parents or guardians for 5168 (96.6%) of 5350 children aged 12–36 months enrolled in the WIC clinics provided written consent for screening. Screening was done by capillary blood sampling onto filter paper (FP), which was dried and tested for lead with atomic absorption spectrophotometry (*2*). The geometric mean BLL was 2.9 µg/dL. BLLs were ≥10 µg/dL for 93 (1.8%) children, ≥15 µg/dL for 25 (0.5%), and ≥20 µg/dL for seven (0.1%).

Parents or guardians for 21 of the 25 children with screening BLLs ≥15 µg/dL agreed to have confirmatory venous sampling and simultaneous repeat FP blood sampling (performed 13–103 days after screening). Venous BLLs ranged from 2 µg/dL to 36 µg/dL; nine were ≥15 µg/dL. Repeat FP BLLs ranged from 4 µg/dL to 40 µg/dL; six were ≥15 µg/dL. Correlation between the simultaneously drawn FP and venous samples was high (Spearman R=0.94), although the FP BLL averaged 1.5 µg/dL lower than the venous BLL (range: 9 µg/dL lower to 4 µg/dL higher).

Twelve (66.7%) of the 18 children with screening BLLs 15–19 µg/dL and all seven children with screening BLLs ≥20 µg/dL resided in a small area of central Salt Lake City

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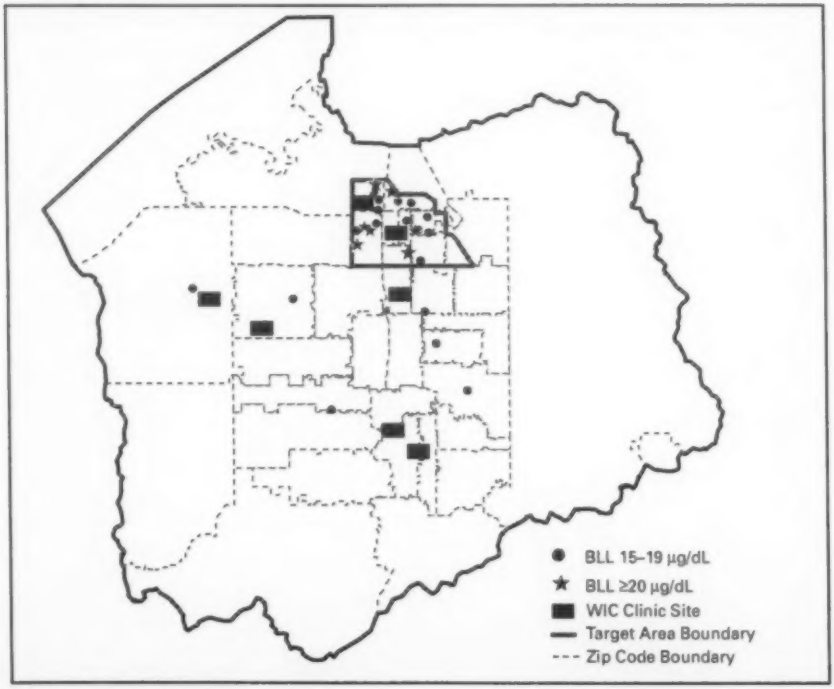
(Figure 1). Environmental assessments by the SLCCHD for the seven children with BLLs ≥20 µg/dL established the probable source of exposure for five children as deteriorating lead-based paint in their homes; for the other two children, no probable source of exposure was identified.

Design and Promotion of Screening Recommendations

The prevalence of BLLs ≥10 µg/dL among WIC screening survey participants varied from 0–6% by zip code area among the 25 (of 34) local zip code areas from which at least 50 children were sampled. SLCCHD used the geographic clustering of elevated BLLs and U.S. census housing data to design a screening "target area" centered around the homes of children in the cluster and extending to adjacent areas of older housing. The target area, bordered by major streets and natural boundaries, included all or nearly all of five zip code areas and smaller portions of an additional five zip code areas. It included approximately 23 square miles (960 square city blocks), representing approximately 10% of the inhabited land and 15% of the population of the county (*3*).

FIGURE 1. Residence of children aged 12–36 months with blood lead levels (BLLs) ≥15 µg/dL identified through screening at Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) clinics, by zip code area of residence, and boundary of area identified for targeted BLL screening — Salt Lake County, Utah, January–October 1995*



*Number screened=5168.

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The target area had a much higher prevalence of houses built before 1950 (55.4%) than the remainder of the county (10.3%) (*3*). Two of the seven WIC clinics were located within the target area. Among WIC participants aged 12–36 months screened during 1995, the prevalence of BLLs ≥10 µg/dL was 4.8% in the target area and 1.2% outside the target area.

In October 1995, SLCCHD mailed a summary of the WIC screening results to private physicians providing primary care to children in the Salt Lake City area (n=327) (compiled from the member roster of the Utah Medical Association and listings in the local telephone book). These physicians were encouraged to begin one-time, office-based blood lead screening as part of routine well-child care for all children aged 6–36 months living in the target area and to screen children living outside the target area who were potentially at greater risk for lead exposure. Identification of children at greater risk was based on responses to a modified CDC questionnaire (*4*) that asked about residence in a home built before 1960 that had deteriorating paint or was being remodeled, household members with work- or hobby-related lead exposures, elevated BLL identified in a household member, and recent residence in the target area. In addition, all 32 pediatricians and family-practice physicians with offices in the target area were visited by SLCCHD staff, who presented the rationale for and the logistics of office-based screening and described the support available from SLCCHD for screening and follow-up of children with BLLs ≥20 µg/dL (*5,6*). On completion of the physician visits in July 1996, a mass mailing advising screening for children aged 12–36 months was sent to all households within the 10 zip code areas that were at least partially within the target area.

Targeted Screening Results

Information about the number of blood lead screening tests performed and the BLLs of those screened are provided to the SLCCHD by laboratories providing blood lead testing for Salt Lake County. Following the promotion of the new screening recommendations, private-sector, office-based blood lead screening increased significantly ($p<0.05$) within both the target area and the nontarget area. For example, during January–March 1996, an average of 11 children (including three children in the target area) aged 12–36 months were screened per month, compared with 88 children (including 57 children in the target area) per month during August–December 1996.

During August–December 1996, a total of 284 (approximately 7%) children in the target area were screened; 21 (7.4%) had BLLs ≥10 µg/dL. Among the 154 children outside the target area also screened during this period, nine (5.8%) had BLLs ≥10 µg/dL. Four children in the target area had BLLs ≥20 µg/dL; on environmental investigation, all elevated BLLs were determined to be related to leaded paint in the child's home. One child not in the target area had a BLL ≥20 µg/dL related to a parent's occupational exposure.

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Editorial Note: Lead is an environmental toxicant with serious adverse effects on children's behavior and development, which can range from decreased growth, hearing, and intelligence at low exposures to encephalopathy and death at high exposures (*4*). BLLs at least as low as 10 µg/dL can adversely affect the health of children, and the higher the BLL, the greater the risk (*4*). CDC generally recommends that children first

Childhood Lead Exposure — Continued

receive blood lead screening at age 1 year but has recommended screening high-risk children as early as age 6 months (*4*). To address elevated BLLs in children, CDC guidelines recommend 1) nutritional and educational interventions for children identified with BLLs 10–19 µg/dL, 2) environmental evaluation to identify lead hazards for children with BLLs ≥20 µg/dL or with BLLs that persist at ≥15 µg/dL, and 3) medical evaluation and intervention for children with BLLs ≥20 µg/dL (*4*).

National data have demonstrated consistent declines in average BLLs in the United States for all age groups since the late 1970s, mainly attributed to bans on the use of lead in household paint, gasoline, food and drink cans, and plumbing systems (*1,7,8*). Public health efforts to prevent childhood lead poisoning, lead paint-abatement programs, and the promulgation of a standard for lead exposure in industry probably also have served to decrease lead exposure for some groups in the United States. Nonetheless, many children in the United States continue to be exposed to lead, primarily through house dust and soil contaminated with lead from deteriorated lead-based paint in older homes and residual lead fallout from vehicle exhaust (*4*). Other exposure sources can include lead and lead dust brought into the home from household members' workplaces or hobbies, lead contained in some "traditional" (i.e., "folk") medicines and cosmetics, and lead that leaches into water or food from plumbing and crystal and ceramic containers (*4*).

The findings in Salt Lake County demonstrate how evaluation of the local distribution of childhood lead exposure risk, targeting of services to those at greatest risk, and outreach to the public and to health-care providers can be combined effectively to reach children who require BLL screening. The proportions of children identified with elevated BLLs in the target area and outside the target area were comparable, which may indicate that the children not in the target area were selected appropriately for screening based on responses to the questionnaire.

Venipuncture is the most accurate sampling method for BLL testing and the only method for confirming an elevated BLL, but fingerstick blood collected with capillary tubes is sufficiently accurate for screening when hands are carefully cleaned to avoid contaminating samples with lead dust on the skin surface (*6*). CDC is evaluating fingerstick blood collected onto FP to determine how accurately blood lead is measured using this method. The overall accuracy of FP sampling in the SLCCHD study cannot be determined because not all children received simultaneous FP and venous BLL tests.

In 1991, CDC recommended universal screening of children aged <6 years except in communities where the prevalence of elevated BLLs is known to be very low (*4*) and therefore is not a practical or cost-beneficial investment of limited resources. As the prevalence of elevated BLLs continues to diminish in the United States, targeting screening to children who remain at elevated risk for lead exposure will become increasingly important. The risk for childhood lead exposure can vary even within a small geographic area, as indicated by the findings in Salt Lake County. Therefore, CDC is developing guidelines to help state and local health departments determine whether to recommend universal or targeted screening within their jurisdictions and communicate those recommendations to the public and to pediatric health-care providers. A draft of these guidelines is available for public review and comment until April 7, 1997; copies can be obtained by calling (888) 232-6789 or accessing the World-Wide Web at http://www.cdc.gov/nceh.

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Nosocomial Hepatitis B Virus Infection Associated with Reusable Fingerstick Blood Sampling Devices — Ohio and New York City, 1996

Fingerstick devices are widely used for capillary-blood sampling for glucose monitoring in patients with diabetes. In 1996, outbreaks of hepatitis B virus (HBV) infection occurred among patients with diabetes in an Ohio nursing home and in a New York City hospital. In response to these outbreaks, nursing-home and hospital personnel, state and local public health officials, and CDC conducted epidemiologic investigations. This report summarizes the investigations, which suggest that, in both outbreaks, HBV transmission was associated with use of spring-loaded fingerstick devices on multiple patients.

In the Ohio outbreak investigation, acute HBV infection was defined as a positive serologic test result for IgM antibody to hepatitis B core antigen (IgM anti-HBc) during June 1995–April 1996, and in the New York outbreak investigation, was defined as a positive serologic test result for IgM anti-HBc or seroconversion from hepatitis B surface antigen (HBsAg)-negative to HBsAg-positive during January–October 1996. Chronic HBV infection was defined as a positive serologic result for HBsAg and total anti-HBc and a negative result for IgM anti-HBc. Persons were considered immune to HBV if their test results were positive for antibody to HBsAg (anti-HBs) as a result of vaccination or positive for anti-HBc and/or anti-HBs as a result of natural infection. Persons were considered susceptible to HBV if their test results were negative for HBsAg, anti-HBc, and anti-HBs.

Nursing Home A, Ohio

From January through March 1996, acute hepatitis B was diagnosed in four residents of an Ohio nursing home. In March 1996, the local health department requested that the Ohio Department of Health (ODH) investigate these cases; after completing its

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assessment, ODH requested assistance from CDC. To determine the extent of transmission, in May 1996 CDC conducted a serosurvey of current and discharged residents who had resided at the nursing home during June 1995–April 1996. Serologic results were available for 74 (94%) of 79 current and former residents (17 other residents had died during this period). Nine (12%) persons had acute HBV infection, two (3%) had chronic infection, five (7%) were immune, and 58 (78%) were susceptible. The attack rate was 13% (nine of 67). HBsAg subtyping was performed on blood samples obtained from eight HBsAg-positive residents (seven with acute infection and one with chronic infection); all were subtype adw2, a common subtype among HBsAg-positive persons in the United States (*1*).

All 11 residents with acute or chronic infection had diabetes and received insulin injections on a routine or supplemental basis. Six susceptible residents also had diabetes, but only one had received insulin on a routine or supplemental basis. To determine risk factors for HBV infection, medical charts of residents who had acute infection or were susceptible were reviewed for history of medications, use of ancillary medical services, and frequency and types of percutaneous exposures, including injections and invasive procedures. Infection-control practices at the nursing home were assessed through interviews with personnel and direct observations of nursing procedures.

All acute infections occurred among persons with diabetes (relative risk [RR]=infinite; 95% confidence interval [CI]=10.1–infinite). Routine (daily) receipt of insulin (RR=19.0; 95% CI=4.5–730.0) and receipt of supplemental insulin (RR=50.8; 95% CI=7.1–360.5) also were highly associated with infection. Among persons who routinely underwent fingerstick capillary sampling, the attack rate was 53%, compared with zero attack rate among persons who did not require finger sticks (RR=infinite; 95% CI=13.2–infinite). The risk for infection was greater among persons who underwent ≥60 finger sticks per month than among those who underwent <60 (RR=15.0; 95% CI=3.5–64.8). The mean number of venous blood draws during June 1995–April 1996 was approximately three times greater for case-patients than for noncase-patients (23 versus six, $p<0.01$). Because all case-residents underwent both fingerstick capillary sampling and phlebotomy, a possible association of venous blood draws with HBV infection could not be examined independently; however, examination of the dates of blood draws for case-patients did not indicate clustering in time.

Neither age, race, sex, room location, nor length of stay were associated with HBV infection, and there was no significant relation between HBV infection and history of blood transfusions; dialysis; medical procedures; intramuscular injections; medication with noninsulin subcutaneous drugs; or visits to the emergency department, podiatrist, dentist, or optometrist.

When the first case was identified in January 1996, the facility routinely used three Monojector®* (Sherwood-Davis and Geck [St. Louis, Missouri]) lancet devices for all residents who required finger sticks. The Monojector® is a pen-like device with a lancet and an end cap that rests on the patient's finger during blood sampling. Nursing personnel had routinely changed lancets between residents, but after the initial supply of end caps for each device had been used, end caps were no longer changed. After recognition of this outbreak, nursing home staff began using individual fingerstick devices for each resident who required finger sticks. In November 1996, a repeat HBV

*Use of trade names and commercial sources is for identification only and does not imply endorsement by the Public Health Service or the U.S. Department of Health and Human Services.

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serosurvey was conducted of all susceptible residents, and no new HBV infections were detected.

Hospital B, New York City

In May 1996, acute hepatitis B was diagnosed in three inpatients in a hospital in New York City. All three patients had diabetes mellitus and had been hospitalized in December 1995 on the same medical ward as a patient with diabetes mellitus and acute hepatitis B (the suspected source case). Attempts were made to contact other patients hospitalized on the medical ward during the 19-day period in December when the suspected source case had been hospitalized. Of the 68 patients identified, 21 (31%) had died, and seven (10%) could not be contacted. Serologic results for the remaining 40 patients indicated that none had acute HBV infection: 20 were susceptible, and 20 were immune.

The median age of the three case-patients was 64 years; all denied commonly recognized risk factors for HBV infection. All three case-patients had had fingerstick capillary blood sampling, compared with none of the 20 susceptible patients (odds ratio=undefined, $p<0.001$). Receipt of insulin also was associated with infection; however, only two of the three case-patients had received insulin. No other common hospital procedure or medication was associated with infection. The HBsAg subtype identified for the three case-patients and the suspected source patient was adw2.

Finger sticks had been performed with the Glucolet® 2 (distributed by Miles [Elkhart, Indiana]), a pen-like device with a disposable lancet and end cap assembly. The lancet assembly was changed after each finger stick, but the pen-like lancet-holding device was used for multiple patients. The nursing staff typically performed finger sticks by starting at one end of the ward and moving from room to room sampling and recording blood glucose levels for patients with diabetes. The case-patients were hospitalized close to the suspected source case; one was a roommate, one was in an adjacent room, and one was in a room diagonally across the hall. Improper use of the fingerstick device (e.g., reusing disposable parts) was not reported by the nursing staff; however, nurses reported observing that hands were not always washed nor gloves changed between patients and that used lancet caps were placed in the same box as unused lancet caps.

Based on a review of serologic records at the hospital, 11 additional patients were identified with possible nosocomially acquired acute HBV infection diagnosed during January–October 1996. These 11 patients had no known risk factors for HBV infection, but all had been hospitalized at least once during the 6 months before diagnosis of their HBV infection. Ten of the 11 patients had received finger sticks while hospitalized; the remaining patient had diabetes mellitus but did not have fingerstick procedures documented in his hospital record. Eight of the 11 patients had been hospitalized on the same two wards. HBsAg subtyping was performed for seven of the eight patients, and all were identified as subtype adw4, a rare subtype present in <1% of HBsAg-positive persons in the United States (*1*).

In May 1996, the hospital instituted use of a completely disposable, nonreusable fingerstick device for capillary blood sampling. In addition, infection-control practices were reemphasized among nursing staff, including handwashing and changing of gloves after contact with each patient. Since implementation of these changes, no new cases of nosocomially acquired HBV infection have been identified.

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Editorial Note: Outbreaks of HBV infection associated with use of spring-loaded fingerstick devices on multiple patients have been reported both in the United States and elsewhere (*2–4*). Various designs of these capillary-blood sampling devices are cleared by the Food and Drug Administration (FDA), but all function similarly. In general, the device is stabilized on the patient's finger by a platform, tip, or end cap containing a hole through which the lancet punctures the skin. In the only previously reported outbreak associated with fingerstick devices in the United States, 26 patients at a hospital in California acquired HBV infection (*2,3*). The platform, a disposable component of the fingerstick device, was not routinely changed between patients and became contaminated, which was the probable mechanism of HBV transmission in this outbreak. After the California outbreak, CDC and FDA issued recommendations for the safe use of spring-loaded fingerstick devices, including, optimally, using a separate device for each patient (*2,5*).

Both of the hepatitis B outbreaks described in this report probably were associated with use of fingerstick devices with a pen-like design, consisting of both reusable and disposable components. The device used in the Ohio nursing home has a separate lancet and end cap. Because the end cap rests on the finger during blood sampling, it can be contaminated with blood after the lancet pierces the skin. The package insert for the device indicates that both the lancet and end cap should be replaced after each use. The finding that the end caps were not routinely changed between residents suggests that HBV transmission occurred through exposure of subsequent patients to residual blood on the end caps.

The device used in the New York hospital has a combined lancet and end cap assembly that was changed as a unit after each use. The exact mechanism of HBV transmission resulting from use of this device is unclear but may have occurred by blood contamination of nurses' gloves or unused lancet caps. The pen-like lancet-holding device, which was shared and not cleaned between patients, also may have served as a vehicle for transmission. The package insert for the device recommends disinfecting the lancet-holding device only after visible contamination with blood.

The results of these investigations reemphasize the need to restrict use of fingerstick capillary-blood sampling devices to individual patients (*2*) and to discard used parts appropriately. In addition, when medical procedures are performed on multiple patients, gloves should be changed after contact with each patient (*6*).

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Hepatitis B Virus — Continued

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Outbreak of Aseptic Meningitis — Whiteside County, Illinois, 1995

Aseptic meningitis (AM) is a severe, nonbacterial infection of the central nervous system that affects an estimated 30,000–50,000 persons each year in the United States (1). On July 21, 1995, the infection-control coordinator of the county hospital in Whiteside County (1990 population: 60,000), Illinois, reported to CDC an outbreak of AM. From June 7 through July 21, 1995, a total of 29 persons had onset of clinical AM, characterized by fever, headache, stiff neck, and photophobia. Many cases had cerebrospinal fluid (CSF) pleocytosis, and all had negative bacterial cultures. Preliminary identification of an enterovirus was made from virus-isolation studies. This report describes the investigation of this outbreak by county and state health officials, which indicated that, although members of the community were concerned about possible transmission at large public gatherings and several swimming locations, there was no risk for illness in these settings.

Whiteside County is located in northwestern Illinois and has an industrial and agricultural economic base. Nearly two thirds (65%) of the population is concentrated in the eastern third of the county, where the two largest towns (Sterling and Rock Falls) are located.

Information about all suspected cases of AM and all lumbar-puncture procedures documented during April–November 1995 was obtained through hospital chart review and by contacting physicians in private practice. A case of AM was defined as headache and either stiff neck or photophobia or a CSF count of ≥10 white blood cells (WBCs)/μL in a resident of Whiteside County. For children aged <4 years, the case definition was restricted to a CSF count of ≥10 WBCs/μL. For persons who had onset of illness during June 1–August 4, 1995 (the peak period of recreational water use), a matched case-control study was conducted to determine whether illness was associated with attendance at large public events, swimming in public swimming locations, or potential household risk factors. Two controls per case were selected by asking case-patients or their guardians to identify casual acquaintances of the same sex and age. CSF and/or stool specimens were obtained from patients during their acute illness for enteroviral isolation studies.

During April–November, 79 cases of AM were identified in Whiteside County (Figure 1). In contrast, during 1990–1994, the annual reported number of cases in the county ranged from zero to seven. The illness rate was substantially higher in Sterling and Rock Falls (22.4 per 10,000 population) than in the remainder of the county (3.7 per 10,000 population). Of 79 case-patients, 41 (52%) were male. The median age was

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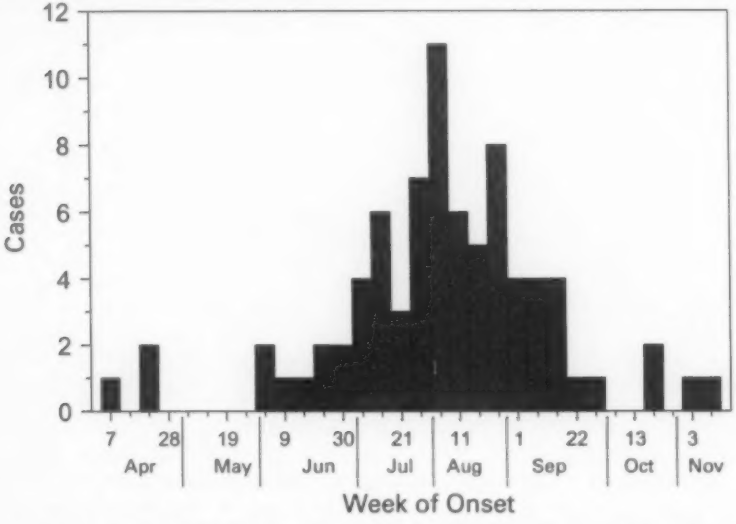
FIGURE 1. Number of cases of aseptic meningitis*, by week of onset — Whiteside County, Illinois, April–November 1995†



*Defined as headache and either stiff neck or photophobia or a cerebrospinal fluid (CSF) count of ≥10 white blood cells (WBCs)/μL in a resident of Whiteside County. For children aged <4 years, the case definition was restricted to a CSF count of ≥10 WBCs/μL.
†n=79.

21 years (range: 0–66 years), with similar rates of illness in all age groups for patients aged ≤50 years; only two patients were aged >50 years. Symptoms most commonly reported by case-patients included headache (100%), stiff neck (78%), fever (76%), nausea or vomiting (75%), muscle aches (57%), and photophobia (42%). Sixty-four patients were hospitalized, and 15 were treated as outpatients (eight in the emergency department and seven in physicians' offices).

Lumbar punctures were performed on 66 (84%) of 79 case-patients. Of the 66 CSF specimens obtained from case-patients, 37 (56%) had WBC counts of ≥10 WBCs/μL; all CSF cultures were negative for bacterial pathogens. Echovirus type 9 was the predominant agent identified from case-patients and was isolated from six (9%) of 66 CSF specimens and three (19%) of 16 stool specimens. In addition, echovirus types 5 and 21 were isolated from one stool specimen. The remaining 11 stool and 60 CSF specimens were either negative or of insufficient quantity for virus isolation.

Of the 79 case-patients, 37 (47%) had onset of illness during June 1–August 4 and were included in the case-control study. The investigation included potential risk factors in the community and in households. Illness was not associated with attendance at any of eight public events (e.g., Independence Day fireworks in Rock Falls) (p=0.9). Similarly, no association was found between illness and participation in swimming, frequency of swimming, location of any swimming, or location of usual swimming (all p>0.5). In addition, no association was found between illness and other possible risk

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factors (e.g., source of household drinking water; household presence of children in diapers or children in day care; or occupation in health-care services, day care, or food handling and preparation) (all p>0.2).

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Editorial Note: The etiologic agent identified in this outbreak was an enterovirus (echovirus type 9), the only virus isolated from CSF. Echovirus type 9 was the predominant enterovirus reported during the summer of 1995 by state health laboratories to CDC (CDC, unpublished data, 1995). Other echoviruses (e.g., serotypes 5 and 21) were identified from stool specimens; however, enteroviruses frequently cocirculate in a community (*1,2*). The rates of isolation of echovirus 9 from stool and CSF specimens of case-patients (19% and 9%, respectively) were lower than those obtained in previous investigations, possibly resulting from the timing of sample collection following onset of illness; the small volume of sample obtained; or loss of virus in the specimen during handling, storage, or shipment.

Transmission of enteroviruses usually is person-to-person, either through the fecal-oral or oral-oral routes. Although enteroviruses can be readily isolated from waste waters and occasionally from recreational waters, studies examining the association of enteroviral illness with recreational water use have obtained varying results. An unusual point-source contamination of a swimming facility in England resulted in an outbreak of echovirus 30 illness: on opening day of the facility, a swimmer became ill and vomited into the pool, which had been inadequately chlorinated; subsequently, other swimmers became ill (*3*). In a study in Wisconsin, an association was found between summertime recreational water use and visits to a pediatric office for milder "enteroviral illness" (*4*). In a study of an outbreak of AM at a boys' camp in New York state, coxsackie B5 was isolated from lake water; however, because most of the ill campers shared the same cabin and had multiple opportunities for person-to-person spread, the investigation determined this was the most likely route of transmission (*5*).

Similarly, in the investigation reported here, no association was found between illness and recreational water use, other community risk factors (e.g., attendance at public events), or household risk factors. Failure of the investigation to find an association with either community or household factors may have resulted from a focus on enteroviral illness rather than infection, the small numbers of persons studied, or the high frequency with which persons participated in the community activities investigated. The outbreak may have been caused by person-to-person transmission rather than communal contamination.

Enteroviral illness and AM typically demonstrate a seasonal pattern, with the highest incidence occurring during the summer and fall months (*1*). This community outbreak occurred during the usual season of greatest enterovirus activity. The magnitude of the outbreak may have been greater than usual because of circulation of a serotype or strain of enterovirus not common to northwestern Illinois and for which little immunity existed in the population. AM outbreaks caused by entoviruses, such as the one in Whiteside County, underscore the importance of public health messages that emphasize the role of personal hygiene (e.g., regular handwashing and avoiding

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sharing of eating utensils and drinking containers) in interrupting transmission of enterovirus infections. Health departments should target messages about hygiene to high-risk populations (e.g., day care centers, families with children in diapers, schools with young children, and school athletic teams).

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Sports-Related Recurrent Brain Injuries — United States

An estimated 300,000 sports-related traumatic brain injuries (TBIs) of mild to moderate severity (*1*), most of which can be classified as concussions (i.e., conditions of temporarily altered mental status as a result of head trauma), occur in the United States each year. The proportion of these concussions that are repeat injuries is unknown; however, there is an increased risk for subsequent TBI among persons who have had at least one previous TBI (*2,3*). Repeated mild brain injuries occurring over an extended period (i.e., months or years) can result in cumulative neurologic and cognitive deficits (*4,5*), but repeated mild brain injuries occurring within a short period (i.e., hours, days, or weeks) can be catastrophic or fatal. The latter phenomenon, termed "second impact syndrome," has been reported more frequently since it was first characterized in 1984 (*6–8*). This report describes two cases of second impact syndrome and presents recommendations developed by the American Academy of Neurology to prevent recurrent brain injuries in sports and their adverse consequences (*9*).

Case Reports

Case 1. During October 1991, a 17-year-old high school football player was tackled on the last play of the first half of a varsity game and struck his head on the ground. During halftime intermission, he told a teammate that he felt ill and had a headache; he did not tell his coach. He played again during the third quarter and received several routine blows to his helmet during blocks and tackles. He then collapsed on the field and was taken to a local hospital in a coma. A computed tomography (CT) brain scan revealed diffuse swelling of the brain and a small subdural hematoma. He was transferred to a regional trauma center, where attempts to reduce elevated intracranial pressure were unsuccessful, and he was pronounced brain dead 4 days later. Autopsy revealed diffuse brain swelling, focal areas of subcortical ischemia, and a small subdural hematoma.

Case 2. During August 1993, a 19-year-old college football player reported headache to family members after a full-contact practice during summer training. During

Sports-Related Brain Injuries — Continued

practice the following day, he collapsed on the field approximately 2 minutes after engaging in a tackle. He was transported to a nearby trauma center, where a CT scan of the head showed diffuse brain swelling and a thin subdural hematoma. Attempts to control the elevated intracranial pressure failed, and he was pronounced brain dead 3 days later. Autopsy revealed the brain to be diffusely swollen with evidence of cerebrovascular congestion and features of temporal lobe herniation.

Summary of Related Data

The true incidence of second impact syndrome is unknown. During 1984–1991, four cases were described, and during 1992–1995, a total of 17 cases were described; most cases have involved male adolescents or young adults and involved participation in boxing, football, ice hockey, and snow skiing (*8*). Combined data from four states (Colorado, Missouri, Oklahoma, and Utah) during 1990–1993 indicated an annual rate of 2.6 cases per 100,000 population of sports-related TBI that resulted in hospitalization or death; the proportion attributable to second impact syndrome is unknown.

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Editorial Note: The two cases described in this report involved repeated head trauma with probable concussions that separately might be considered mild but in additive effect were fatal. The risk for catastrophic effects from successive, seemingly mild concussions sustained within a short period is not yet widely recognized. Second impact syndrome results from acute, usually fatal, brain swelling that occurs when a second concussion is sustained before complete recovery from a previous concussion. Brain swelling apparently results from a failure of autoregulation of cerebral circulation that causes vascular congestion and increased intracranial pressure, which may be difficult or impossible to control (*7*).

Population-based data are needed to define the incidence of this condition, describe causes, and identify populations at highest risk. CDC is developing a multistate system for TBI surveillance (*10*). Based on this surveillance system, CDC, in collaboration with participating states, is developing methods to conduct surveillance for sports-related second impact syndrome.

The risk for second impact syndrome should be considered in a variety of sports associated with likelihood of blows to the head, including boxing, football, ice or roller hockey, soccer, baseball, basketball, and snow skiing. The American Academy of Neurology has proposed recommendations for the management of concussion in sports that are designed to prevent second impact syndrome and to reduce the frequency of other cumulative brain injuries related to sports (*9*) (see box). These recommendations define symptoms and signs of concussion of varying severity and indicate intervals during which athletes should refrain from sports activity following a concussion. Following head impact, athletes with any alteration of mental status, including transient confusion or amnesia with or without loss of consciousness, should not return to activity until examined by a health-care provider familiar with these guidelines.

The popularity of contact sports in the United States exposes a large number of participants to risk for brain injury. Recurrent brain injuries can be serious or fatal and may not respond to medical treatment. However, recurrent brain injuries and second

Sports-Related Brain Injuries — Continued

Summary of Recommendations for Management of Concussion in Sports

A concussion is defined as head-trauma–induced alteration in mental status that may or may not involve loss of consciousness. Concussions are graded in three categories. Definitions and treatment recommendations for each category are presented below.

Grade 1 Concussion

- **Definition:** Transient confusion, no loss of consciousness, and a duration of mental status abnormalities of <15 minutes.
- **Management:** The athlete should be removed from sports activity, examined immediately and at 5-minute intervals, and allowed to return that day to the sports activity only if postconcussive symptoms resolve within 15 minutes. Any athlete who incurs a second Grade 1 concussion on the same day should be removed from sports activity until asymptomatic for 1 week.

Grade 2 Concussion

- **Definition:** Transient confusion, no loss of consciousness, and a duration of mental status abnormalities of ≥15 minutes.
- **Management:** The athlete should be removed from sports activity and examined frequently to assess the evolution of symptoms, with more extensive diagnostic evaluation if the symptoms worsen or persist for >1 week. The athlete should return to sports activity only after asymptompatic for 1 full week. Any athlete who incurs a Grade 2 concussion subsequent to a Grade 1 concussion on the same day should be removed from sports activity until asymptomatic for 2 weeks.

Grade 3 Concussion

- **Definition:** Loss of consciousness, either brief (seconds) or prolonged (minutes or longer).
- **Management:** The athlete should be removed from sports activity for 1 full week without symptoms if the loss of consciousness is brief or 2 full weeks without symptoms if the loss of consciousness is prolonged. If still unconscious or if abnormal neurologic signs are present at the time of initial evaluation, the athlete should be transported by ambulance to the nearest hospital emergency department. An athlete who suffers a second Grade 3 concussion should be removed from sports activity until asymptomatic for 1 month. Any athlete with an abnormality on computed tomography or magnetic resonance imaging brain scan consistent with brain swelling, contusion, or other intracranial pathology should be removed from sports activities for the season and discouraged from future return to participation in contact sports.

Source: Quality Standards Subcommittee, American Academy of Neurology.

Sports-Related Brain Injuries — Continued

impact syndrome are highly preventable. Physicians, health and physical education instructors, athletic coaches and trainers, parents of children participating in contact sports, and the general public should become familiar with these recommendations.

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Erratum: Vol. 46, No. 2

In the Notice to Readers "Recommended Childhood Immunization Schedule—United States, 1997," in the double asterisk footnote on page 39, the manufacturer of the HbOC component of Tetramune was incorrect. Instead of Praxis Biologics, the manufacturer should have been listed as *Lederle Laboratories, Inc., Division of American Cyanamid (Pearl River, New York).*

Erratum: Vol. 45, No. RR-12

In the *MMWR Recommendations and Reports* entitled "Update: Vaccine Side Effects, Adverse Reactions, Contraindications, and Precautions—Recommendations of the Advisory Committee on Immunization Practices (ACIP)," the first complete paragraph on page 10 should read: "OPV should not be administered to persons who have experienced an anaphylactic reaction to a previous dose of OPV." The next paragraph should read: "IPV should not be administered to persons who have experienced a) an anaphylactic reaction following a previous dose of IPV or b) an anaphylactic reaction to streptomycin, polymyxin B, or neomycin."

Erratum: Vol. 46, No. 8

In Table 2 of the report "National, State, and Urban Area Vaccination Coverage Levels Among Children Aged 19–35 Months—United States, January–December 1995," the text of the ** and †† footnotes is incorrect. The corrected table appears on page 228.

TABLE 2. Estimated vaccination coverage with the 4:3:1 series* and the 4:3:1:3 series†, by coverage level and state — United States, National Immunization Survey, 1995

Coverage level/ State	4:3:1 Series coverage %	(95% CI§)	Coverage level/ State	4:3:1:3 Series coverage %	(95% CI)
≥85%			≥85%		
Connecticut¶	85	(±4.7)	Maine	87	(±3.9)
Maine¶	89	(±3.8)	New Hampshire	86	(±3.8)
New Hampshire¶	87	(±3.8)	75%–84%		
Vermont¶	86	(±4.1)	Alabama	75	(±4.7)
75%–84%			Colorado	77	(±5.4)
Alabama¶	77	(±4.6)	Connecticut	83	(±4.9)
Colorado¶	78	(±5.3)	Florida	75	(±4.6)
Delaware**	75	(±5.8)	Georgia	77	(±4.9)
Florida**	76	(±4.6)	Hawaii	78	(±5.8)
Georgia¶	78	(±4.8)	Illinois	79	(±4.1)
Hawaii¶	81	(±5.5)	Indiana	75	(±4.6)
Illinois¶	81	(±4.0)	Iowa	82	(±4.4)
Indiana**	76	(±4.6)	Kentucky	79	(±5.6)
Iowa**	83	(±4.2)	Louisiana	76	(±4.7)
Kentucky**	80	(±5.5)	Maryland	78	(±4.5)
Louisiana**	77	(±4.6)	Massachusetts	80	(±4.3)
Maryland¶	81	(±4.3)	Minnesota	76	(±5.4)
Massachusetts¶	81	(±4.3)	Mississippi	81	(±5.2)
Minnesota††	77	(±5.3)	Missouri	75	(±5.7)
Mississippi††	83	(±5.0)	Nebraska	75	(±5.2)
Missouri¶	76	(±5.6)	New Mexico	76	(±5.6)
Nebraska¶	78	(±5.0)	New York	77	(±4.3)
New Jersey¶	75	(±5.3)	North Carolina	80	(±5.0)
New Mexico**	77	(±5.5)	North Dakota	81	(±4.8)
New York¶	79	(±4.2)	Pennsylvania	76	(±4.7)
North Carolina¶	81	(±5.0)	Rhode Island	82	(±4.8)
North Dakota¶	82	(±4.8)	South Carolina	80	(±4.7)
Oklahoma**	76	(±5.6)	South Dakota	79	(±4.5)
Pennsylvania¶	78	(±4.5)	Vermont	84	(±4.3)
Rhode Island¶	83	(±4.7)	Washington	77	(±4.2)
South Carolina¶	80	(±4.7)	65%–74%		
South Dakota¶	80	(±4.5)	Alaska	72	(±6.4)
Texas¶	76	(±3.5)	Arizona	70	(±4.9)
Washington¶	78	(±4.2)	Arkansas	73	(±5.6)
Wisconsin¶	77	(±3.8)	California	69	(±4.6)
65%–74%			Delaware	72	(±5.9)
Alaska**	74	(±6.3)	Kansas	70	(±5.8)
Arizona**	73	(±4.8)	Michigan	67	(±4.9)
Arkansas¶	74	(±5.5)	Montana	71	(±5.6)
California**	71	(±4.6)	Nevada	65	(±6.3)
Idaho**	66	(±5.9)	New Jersey	72	(±5.5)
Kansas††	72	(±5.8)	Ohio	73	(±4.3)
Michigan**	70	(±4.8)	Oklahoma	73	(±5.7)
Montana**	74	(±5.4)	Oregon	72	(±5.8)
Nevada**	68	(±6.3)	Tennessee	73	(±4.0)
Ohio**	74	(±4.2)	Texas	73	(±3.6)
Oregon**	74	(±5.7)	Utah	66	(±5.3)
Tennessee**	74	(±4.0)	Virginia	71	(±5.9)
Utah**	68	(±5.3)	West Virginia	71	(±5.6)
Virginia**	74	(±5.8)	Wisconsin	74	(±3.9)
West Virginia††	73	(±5.6)	Wyoming	71	(±5.7)
Wyoming††	74	(±5.6)	<65%		
			Idaho	64	(±5.9)
Total	**76**	**(±1.0)**	**Total**	**74**	**(±1.0)**

*Four or more doses of diphtheria and tetanus toxoids and pertussis vaccine/Diphtheria and tetanus toxoids (DTP/DT), three or more doses of poliovirus vaccine, and one or more doses of measles-containing vaccine (MCV).

†Four or more doses of DTP/DT, three or more doses of poliovirus vaccine, one or more doses of MCV, and three or more doses of *Haemophilus influenzae* type b vaccine (Hib).

§Confidence interval.

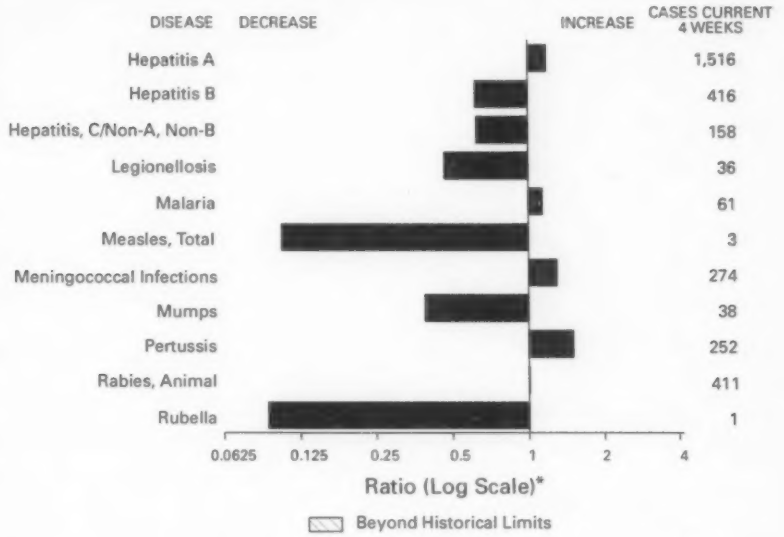
¶Achieved the 1995 Childhood Immunization Initiative (CII) goals for three or more doses of DTP, three or more doses of poliovirus vaccine, one or more doses of MCV, three or more doses of Hib, and three or more doses of hepatitis B vaccine.

**Did not achieve the 1995 CII goal for at least one of the following: three or more doses of DTP, three or more doses of poliovirus vaccine, one or more doses of MCV, or three or more doses of Hib but achieved the 1995 goal for three or more doses of hepatitis B vaccine.

††Achieved the 1995 CII goals for three or more doses of DTP, three or more doses of poliovirus vaccine, one or more doses of MCV, and three or more doses of Hib but not for three or more doses of hepatitis B vaccine.

‡‡Did not achieve the 1995 CII goal for at least one of the following: three or more doses of DTP, three or more doses of poliovirus vaccine, one or more doses of MCV, or three or more doses of Hib and did not achieve the 1995 goal for three or more doses of hepatitis B vaccine.

FIGURE I. Selected notifiable disease reports, comparison of provisional 4-week totals ending March 8, 1997, with historical data — United States



*Ratio of current 4-week total to mean of 15 4-week totals (from previous, comparable, and subsequent 4-week periods for the past 5 years). The point where the hatched area begins is based on the mean and two standard deviations of these 4-week totals.

TABLE I. Summary — provisional cases of selected notifiable diseases, United States, cumulative, week ending March 8, 1997 (10th Week)

	Cum. 1997		Cum. 1997
Anthrax	-	Plague	-
Brucellosis	4	Poliomyelitis, paralytic	-
Cholera	-	Psittacosis	6
Congenital rubella syndrome	1	Rabies, human	-
Cryptosporidiosis*	173	Rocky Mountain spotted fever (RMSF)	15
Diphtheria	-	Streptococcal disease, invasive Group A	136
Encephalitis: California*	-	Streptococcal toxic-shock syndrome*	5
eastern equine*	-	Syphilis, congenital¶	-
St. Louis*	-	Tetanus	4
western equine*	-	Toxic-shock syndrome	18
Hansen Disease	21	Trichinosis	2
Hantavirus pulmonary syndrome*†	-	Typhoid fever	47
Hemolytic uremic syndrome, post-diarrheal*	9	Yellow fever	-
HIV infection, pediatric*§	19		

-:no reported cases
*Not notifiable in all states.
†Updated weekly from reports to the Division of Viral and Rickettsial Diseases, National Center for Infectious Diseases (NCID).
§Updated monthly to the Division of HIV/AIDS Prevention–Surveillance and Epidemiology, National Center for HIV, STD, and TB Prevention (NCHSTP), last update January 28, 1997.
¶Updated from reports to the Division of STD Prevention, NCHSTP.

TABLE II. Provisional cases of selected notifiable diseases, United States, weeks ending March 8, 1997, and March 9, 1996 (10th Week)

Reporting Area	AIDS*		Chlamydia		*Escherichia coli* O157:H7		Gonorrhea		Hepatitis C/NA,NB	
	Cum. 1997	Cum. 1996	Cum. 1997	Cum. 1996	NETSS† Cum. 1997	PHLIS§ Cum. 1997	Cum. 1997	Cum. 1996	Cum. 1997	Cum. 1996
UNITED STATES	5,109	9,988	56,023	69,944	168	65	39,759	59,064	480	527
NEW ENGLAND	134	446	2,659	3,594	14	7	1,044	1,485	2	13
Maine	13	8	49	-	1	-	3	7	-	-
N.H.	1	14	98	110	-	-	33	26	1	2
Vt.	7	5	71	95	1	1	9	16	-	7
Mass.	62	246	1,343	1,273	10	6	463	492	1	4
R.I.	19	17	402	446	1	-	110	114	-	-
Conn.	32	156	696	1,670	1	-	426	830	-	-
MID. ATLANTIC	1,921	2,864	3,816	8,956	9	-	2,401	5,211	33	36
Upstate N.Y.	113	324	N	N	5	-	240	5	23	31
N.Y. City	1,039	1,621	-	3,564	2	-	-	2,375	-	1
N.J.	468	550	915	1,428	2	-	637	692	-	-
Pa.	301	369	2,901	3,964	N	-	1,524	2,139	10	4
E.N. CENTRAL	242	821	10,240	16,873	28	11	7,105	11,210	106	77
Ohio	57	249	2,157	3,941	14	7	1,643	2,733	5	2
Ind.	25	90	1,674	1,652	5	-	1,201	1,285	1	2
Ill.	115	321	2,053	4,986	-	-	1,108	3,287	-	14
Mich.	29	106	3,217	4,095	9	2	2,557	2,909	100	59
Wis.	16	55	1,139	2,199	N	2	596	996	-	-
W.N. CENTRAL	127	247	3,751	5,769	22	14	1,757	2,577	19	13
Minn.	17	56	-	999	10	9	U	-	-	-
Iowa	38	22	993	549	7	2	238	183	10	3
Mo.	54	90	1,692	2,417	1	-	1,157	1,779	3	7
N. Dak.	2	-	81	157	3	2	5	7	1	-
S. Dak.	-	3	178	199	-	-	24	33	-	-
Nebr.	15	22	163	542	1	-	60	98	-	2
Kans.	1	54	644	906	-	1	273	477	5	1
S. ATLANTIC	1,239	2,454	14,208	9,836	26	4	16,101	21,619	49	23
Del.	20	72	-	-	1	1	205	300	-	-
Md.	166	196	1,180	1,030	2	-	2,408	2,611	4	-
D.C.	55	126	N	N	-	-	889	884	-	-
Va.	130	126	2,304	2,146	N	-	1,793	1,905	4	1
W. Va.	14	19	-	-	N	-	114	99	1	4
N.C.	59	34	3,519	U	2	3	3,122	4,171	16	8
S.C.	104	91	1,823	U	-	-	2,296	2,418	12	1
Ga.	183	447	1,444	2,462	13	-	2,340	5,601	U	-
Fla.	508	1,343	3,938	4,198	8	-	2,934	3,630	12	9
E.S. CENTRAL	134	358	4,866	5,185	15	4	4,900	5,778	54	101
Ky.	23	67	1,179	1,349	4	-	737	800	2	5
Tenn.	59	140	2,170	2,280	9	4	1,931	2,080	23	95
Ala.	37	89	1,250	1,502	-	-	1,907	2,449	4	1
Miss.	15	62	267	54	2	-	325	449	25	-
W.S. CENTRAL	420	944	2,424	3,984	3	1	2,495	5,027	41	48
Ark.	18	45	228	297	2	-	440	837	2	1
La.	64	221	1,154	-	1	1	1,230	1,570	28	9
Okla.	32	26	1,042	1,254	-	-	825	792	-	25
Tex.	306	652	-	2,433	-	-	-	1,828	11	13
MOUNTAIN	122	251	3,819	2,066	21	14	1,336	1,558	62	135
Mont.	7	3	126	-	-	-	9	4	3	5
Idaho	2	4	298	302	1	-	21	14	12	31
Wyo.	1	-	73	129	-	-	7	8	18	38
Colo.	24	85	101	5	13	5	269	388	13	13
N. Mex.	5	20	797	730	3	1	300	176	8	24
Ariz.	30	94	1,704	67	N	6	564	765	5	16
Utah	10	39	248	295	1	-	33	55	1	5
Nev.	43	6	472	538	3	2	133	148	2	3
PACIFIC	770	1,603	10,240	13,681	30	8	2,620	4,599	114	81
Wash.	45	139	1,717	1,816	3	-	418	472	5	15
Oreg.	30	101	422	1,007	8	6	58	64	3	2
Calif.	682	1,338	7,597	10,435	16	2	1,956	3,883	70	30
Alaska	10	3	256	73	3	-	108	84	-	2
Hawaii	3	22	248	350	N	-	80	96	36	32
Guam	-	3	-	76	N	-	-	18	-	-
P.R.	144	248	N	N	4	U	151	28	4	7
V.I.	4	1	N	N	N	U	-	-	-	-
Amer. Samoa	-	-	-	-	N	U	-	-	-	-
C.N.M.I.	-	-	N	N	N	U	-	8	-	-

N: Not notifiable U: Unavailable -: no reported cases C.N.M.I.: Commonwealth of Northern Mariana Islands

*Updated monthly to the Division of HIV/AIDS Prevention–Surveillance and Epidemiology, National Center for HIV, STD, and TB Prevention, last update January 28, 1997.

†National Electronic Telecommunications System for Surveillance.

§Public Health Laboratory Information System.

TABLE II. (Cont'd.) Provisional cases of selected notifiable diseases, United States, weeks ending March 8, 1997, and March 9, 1996 (10th Week)

Reporting Area	Legionellosis		Lyme Disease		Malaria		Syphilis (Primary & Secondary)		Tuberculosis		Rabies, Animal
	Cum. 1997	Cum. 1996	Cum. 1997	Cum. 1996	Cum. 1997	Cum. 1996	Cum. 1997	Cum. 1996	Cum. 1997	Cum. 1996	Cum. 1997
UNITED STATES	152	131	319	808	202	185	1,292	2,341	1,939	2,505	971
NEW ENGLAND	12	4	39	60	5	4	27	36	57	67	151
Maine	1	1	-	-	-	1	-	-	-	3	35
N.H.	2	-	2	-	-	-	-	-	2	2	4
Vt.	2	-	1	-	-	1	-	-	-	-	24
Mass.	4	1	24	4	4	2	14	16	30	21	28
R.I.	-	2	12	17	1	-	-	-	5	10	1
Conn.	3	N	-	39	-	-	13	20	20	31	61
MID. ATLANTIC	30	29	220	688	43	54	20	72	346	378	203
Upstate N.Y.	8	6	17	190	6	11	3	7	31	42	150
N.Y. City	-	1	1	202	23	25	-	28	193	183	-
N.J.	3	5	45	58	12	15	2	16	81	91	17
Pa.	19	17	157	238	2	3	15	21	41	62	36
E.N. CENTRAL	57	49	7	4	10	23	136	385	306	364	2
Ohio	33	17	7	2	1	3	47	152	63	57	1
Ind.	4	10	-	2	1	1	31	55	16	28	1
Ill.	-	4	-	-	-	8	16	95	176	237	-
Mich.	20	14	-	-	8	7	22	38	33	34	-
Wis.	-	4	U	U	-	4	20	45	18	8	-
W.N. CENTRAL	6	8	1	10	2	3	33	123	63	62	61
Minn.	-	-	-	-	-	-	-	32	20	13	10
Iowa	-	-	-	1	1	1	10	4	8	8	34
Mo.	2	3	-	1	1	1	14	78	24	24	7
N. Dak.	-	-	-	-	-	-	-	-	2	1	9
S. Dak.	-	1	-	-	-	-	-	-	1	6	-
Nebr.	4	4	1	-	-	-	-	4	-	-	-
Kans.	-	-	-	8	-	1	9	5	8	10	1
S. ATLANTIC	22	12	30	30	58	31	573	728	343	387	465
Del.	2	1	-	6	2	2	3	10	-	9	2
Md.	13	2	21	16	17	11	125	108	30	39	90
D.C.	1	1	4	-	4	1	25	26	15	11	1
Va.	-	2	-	-	11	5	60	87	16	25	92
W. Va.	-	1	-	2	-	-	-	1	7	16	10
N.C.	3	3	2	4	2	4	132	189	53	40	149
S.C.	1	1	1	-	3	1	88	87	48	59	17
Ga.	-	-	1	-	8	2	92	170	60	75	48
Fla.	2	1	1	2	11	5	48	50	114	113	56
E.S. CENTRAL	5	10	13	6	5	1	304	590	118	224	44
Ky.	-	3	1	3	1	1	29	33	26	39	7
Tenn.	2	4	2	3	1	-	154	179	9	84	29
Ala.	1	-	-	-	1	-	85	124	73	72	8
Miss.	2	3	10	-	2	-	36	254	10	49	-
W.S. CENTRAL	-	-	1	-	3	6	142	263	32	108	20
Ark.	-	-	-	-	1	-	16	64	20	20	4
La.	-	-	-	-	2	-	100	101	-	-	-
Okla.	-	-	-	-	-	-	26	24	12	25	16
Tex.	-	-	1	-	-	6	-	74	-	63	-
MOUNTAIN	11	8	-	-	13	11	29	31	68	95	2
Mont.	-	-	-	-	1	-	-	-	2	-	1
Idaho	-	-	-	-	-	-	-	1	-	2	-
Wyo.	-	-	-	-	1	1	-	1	1	-	-
Colo.	3	4	-	-	6	5	-	11	10	21	-
N. Mex.	-	-	-	-	2	1	-	-	4	7	-
Ariz.	3	1	-	-	-	1	24	15	32	52	1
Utah	4	-	-	-	-	2	1	-	1	-	-
Nev.	1	3	-	-	3	1	4	3	18	13	-
PACIFIC	9	11	8	10	63	52	28	113	606	820	23
Wash.	1	-	-	-	-	-	3	-	30	41	-
Oreg.	-	-	2	4	4	4	1	1	23	36	1
Calif.	7	11	6	5	59	45	23	111	499	696	21
Alaska	-	-	-	-	-	-	-	-	18	17	1
Hawaii	1	-	-	1	-	3	1	1	36	30	-
Guam	-	-	-	-	-	-	-	2	-	22	-
P.R.	-	-	-	-	1	-	52	23	-	-	9
V.I.	-	-	-	-	-	-	-	-	-	-	-
Amer. Samoa	-	-	-	-	-	-	-	-	-	-	-
C.N.M.I.	-	-	-	-	-	-	-	-	-	-	-

N: Not notifiable U: Unavailable -: no reported cases

TABLE III. Provisional cases of selected notifiable diseases preventable by vaccination, United States, weeks ending March 8, 1997, and March 9, 1996 (10th Week)

Reporting Area	*H. influenzae*, invasive		Hepatitis (Viral), by type				Measles (Rubeola)					
			A		B		Indigenous		Imported†		Total	
	Cum. 1997*	Cum. 1996	Cum. 1997	Cum. 1996	Cum. 1997	Cum. 1996	1997	Cum. 1997	1997	Cum. 1997	Cum. 1997	Cum. 1996
UNITED STATES	219	231	4,313	4,919	1,206	1,513	-	5	-	3	8	32
NEW ENGLAND	7	7	79	43	21	27	-	-	-	-	-	5
Maine	2	-	3	5	2	2	-	-	-	-	-	-
N.H.	1	5	6	3	2	-	-	-	-	-	-	-
Vt.	-	-	4	-	1	2	-	-	-	-	-	1
Mass.	3	2	30	20	12	3	-	-	-	-	-	4
R.I.	1	-	4	2	2	1	-	-	-	-	-	-
Conn.	-	-	32	13	2	19	-	-	-	-	-	-
MID. ATLANTIC	23	29	244	367	167	269	-	1	-	-	1	3
Upstate N.Y.	1	3	14	51	21	51	-	1	-	-	1	1
N.Y. City	9	4	105	184	59	131	-	-	-	-	-	2
N.J.	9	14	56	75	44	48	-	-	-	-	-	-
Pa.	4	8	69	57	43	39	-	-	-	-	-	-
E.N. CENTRAL	26	43	317	489	134	195	-	1	-	1	2	-
Ohio	18	25	95	200	18	21	-	-	-	-	-	-
Ind.	5	1	48	79	10	16	-	-	-	-	-	-
Ill.	-	14	-	112	-	52	-	1	-	-	1	-
Mich.	3	1	148	59	104	82	-	-	-	1	1	-
Wis.	-	2	26	39	2	24	-	-	-	-	-	-
W.N. CENTRAL	4	7	306	389	56	80	-	-	-	-	-	-
Minn.	2	-	1	7	-	2	-	-	-	-	-	-
Iowa	1	3	42	100	28	9	-	-	-	-	-	-
Mo.	1	4	180	193	19	51	-	-	-	-	-	-
N. Dak.	-	-	3	5	-	-	-	-	-	-	-	-
S. Dak.	-	-	5	20	-	-	-	-	-	-	-	-
Nebr.	-	-	27	34	2	5	-	-	-	-	-	-
Kans.	-	-	48	30	7	13	-	-	-	-	-	-
S. ATLANTIC	51	38	308	149	160	202	-	-	-	-	-	1
Del.	-	-	7	3	1	-	-	-	-	-	-	-
Md.	16	14	80	40	32	60	-	-	-	-	-	-
D.C.	2	-	9	5	13	3	-	-	-	-	-	-
Va.	2	2	33	22	16	25	-	-	-	-	-	-
W. Va.	1	-	3	4	4	6	-	-	-	-	-	-
N.C.	7	6	47	21	33	57	-	-	-	-	-	-
S.C.	4	2	18	15	8	8	-	-	-	-	-	-
Ga.	4	13	36	-	12	-	-	-	-	-	-	-
Fla.	15	1	75	39	41	43	-	-	-	-	-	1
E.S. CENTRAL	11	8	109	362	125	126	-	-	-	-	-	-
Ky.	1	2	13	5	3	17	-	-	-	-	-	-
Tenn.	10	2	48	285	68	98	-	-	-	-	-	-
Ala.	-	3	29	32	15	11	-	-	-	-	-	-
Miss.	-	1	19	40	39	U	-	-	-	-	-	-
W.S. CENTRAL	7	8	732	680	81	86	-	-	-	-	-	-
Ark.	-	-	58	102	11	17	-	-	-	-	-	-
La.	-	-	25	11	9	7	-	-	-	-	-	-
Okla.	6	8	322	376	3	13	-	-	-	-	-	-
Tex.	1	-	327	191	58	49	-	-	-	-	-	-
MOUNTAIN	20	17	786	742	175	195	-	-	-	-	-	3
Mont.	-	-	30	13	1	-	-	-	-	-	-	-
Idaho	-	1	37	93	9	22	-	-	-	-	-	-
Wyo.	-	-	3	5	7	5	U	-	U	-	-	-
Colo.	2	3	95	69	39	32	-	-	-	-	-	-
N. Mex.	1	6	60	116	61	81	-	-	-	-	-	-
Ariz.	9	4	312	205	29	17	-	-	-	-	-	-
Utah	1	2	183	184	17	26	-	-	-	-	-	-
Nev.	7	1	66	57	12	12	-	-	-	-	-	3
PACIFIC	70	74	1,432	1,698	287	333	-	3	-	2	5	20
Wash.	-	-	94	103	10	16	-	-	-	-	-	4
Oreg.	7	9	80	259	30	31	-	-	-	-	-	-
Calif.	61	63	1,215	1,303	239	284	-	-	-	2	2	1
Alaska	-	-	8	12	4	1	-	-	-	-	-	14
Hawaii	2	2	35	21	4	1	-	3	-	-	3	1
Guam	-	-	-	2	-	-	U	-	U	-	-	-
P.R.	-	-	49	12	108	21	-	-	-	-	-	-
V.I.	-	-	-	-	-	-	U	-	U	-	-	-
Amer. Samoa	-	-	-	-	-	-	U	-	U	-	-	-
C.N.M.I.	-	10	-	1	-	3	U	-	U	-	-	-

N: Not notifiable U: Unavailable -: no reported cases

*Of 46 cases among children aged <5 years, serotype was reported for 18 and of those, 7 were type b.

†For imported measles, cases include only those resulting from importation from other countries.

TABLE III. (Cont'd.) Provisional cases of selected notifiable diseases preventable by vaccination, United States, weeks ending March 8, 1997, and March 9, 1996 (10th Week)

Reporting Area	Meningococcal Disease		Mumps			Pertussis			Rubella		
	Cum. 1997	Cum. 1996	1997	Cum. 1997	Cum. 1996	1997	Cum. 1997	Cum. 1996	1997	Cum. 1997	Cum. 1996
UNITED STATES	732	782	14	88	110	63	800	416	1	2	31
NEW ENGLAND	49	32	-	2	-	11	216	107	-	-	-
Maine	6	6	-	-	-	2	6	2	-	-	-
N.H.	5	1	-	-	-	3	35	10	-	-	-
Vt.	2	1	-	-	-	2	80	6	-	-	-
Mass.	29	8	-	-	-	2	85	89	-	-	-
R.I.	1	5	-	1	-	2	9	-	-	-	-
Conn.	6	11	-	1	-	-	1	-	-	-	-
MID. ATLANTIC	48	68	2	7	17	2	41	49	-	1	4
Upstate N.Y.	10	14	-	-	5	1	23	29	-	-	2
N.Y. City	11	10	-	-	3	-	5	8	-	1	1
N.J.	11	16	-	-	2	-	-	3	-	-	1
Pa.	16	28	2	7	7	1	13	9	-	-	-
E.N. CENTRAL	63	102	-	11	29	2	87	72	-	-	1
Ohio	39	42	-	3	14	2	42	35	-	-	-
Ind.	10	9	-	4	5	-	4	3	-	-	-
Ill.	-	30	-	2	5	-	12	6	-	-	1
Mich.	6	7	-	2	5	-	17	7	-	-	-
Wis.	8	14	-	-	-	-	12	21	-	-	-
W.N. CENTRAL	57	75	1	4	2	7	38	7	-	-	-
Minn.	2	3	1	2	-	7	25	1	-	-	-
Iowa	14	12	-	2	-	-	9	2	-	-	-
Mo.	25	39	-	-	-	-	-	3	-	-	-
N. Dak.	-	1	-	-	2	-	1	-	-	-	-
S. Dak.	3	2	-	-	-	-	1	-	-	-	-
Nebr.	4	8	-	-	-	-	2	1	-	-	-
Kans.	9	10	-	-	-	-	-	-	-	-	-
S. ATLANTIC	158	109	1	16	15	12	75	26	-	-	-
Del.	3	1	-	-	-	-	-	2	-	-	-
Md.	17	13	1	1	8	3	31	19	-	-	-
D.C.	1	2	-	-	-	-	2	-	-	-	-
Va.	9	14	-	1	2	6	13	-	-	-	-
W. Va.	1	4	-	-	-	-	3	-	-	-	-
N.C.	31	19	-	4	-	-	12	-	-	-	-
S.C.	32	17	-	1	3	1	3	-	-	-	-
Ga.	24	31	-	2	1	-	3	1	-	-	-
Fla.	40	8	-	7	1	2	8	4	-	-	-
E.S. CENTRAL	62	62	-	7	6	2	19	13	-	-	-
Ky.	11	8	-	-	-	-	1	6	-	-	-
Tenn.	25	16	-	2	1	1	6	4	-	-	-
Ala.	19	19	-	2	3	1	7	1	-	-	-
Miss.	7	19	-	3	2	-	5	2	-	-	N
W.S. CENTRAL	61	87	1	9	3	2	10	5	-	-	-
Ark.	12	9	-	-	-	-	3	2	-	-	-
La.	12	17	-	-	3	1	2	1	-	-	-
Okla.	8	4	-	-	-	-	-	1	-	-	-
Tex.	29	57	1	9	-	1	5	1	-	-	-
MOUNTAIN	45	53	2	4	5	11	158	51	-	-	-
Mont.	4	1	-	-	-	-	-	2	-	-	-
Idaho	4	6	1	1	-	5	96	8	-	-	-
Wyo.	-	3	U	-	-	U	3	-	U	-	-
Colo.	5	6	1	2	-	5	47	8	-	-	-
N. Mex.	10	12	N	N	N	-	7	14	-	-	-
Ariz.	12	16	-	-	1	1	5	3	-	-	-
Utah	7	4	-	1	-	-	-	1	-	-	-
Nev.	3	5	-	-	4	-	-	15	-	-	-
PACIFIC	189	194	7	28	33	14	156	86	1	1	26
Wash.	18	16	-	3	2	7	42	10	-	-	1
Oreg.	49	32	-	-	-	-	4	17	-	-	-
Calif.	121	141	7	21	24	7	105	55	1	1	24
Alaska	-	3	-	-	1	-	1	-	-	-	-
Hawaii	1	2	-	4	6	-	4	4	-	-	1
Guam	-	1	U	-	1	U	-	-	U	-	-
P.R.	2	-	-	-	1	-	-	-	-	-	-
V.I.	-	-	U	-	-	U	-	-	U	-	-
Amer. Samoa	-	-	U	-	-	U	-	-	U	-	-
C.N.M.I.	-	-	U	-	-	U	-	-	U	-	-

N: Not notifiable U: Unavailable -: no reported cases

TABLE IV. Deaths in 122 U.S. cities,* week ending March 8, 1997 (10th Week)

Reporting Area	All Causes, By Age (Years)						P&I† Total
	All Ages	>65	45-64	25-44	1-24	<1	
NEW ENGLAND	678	480	131	42	6	18	57
Boston, Mass.	189	115	50	12	3	8	15
Bridgeport, Conn.	40	32	5	3	-	-	3
Cambridge, Mass.	27	24	2	1	-	-	-
Fall River, Mass.	36	30	3	2	1	-	5
Hartford, Conn.	59	33	15	6	1	4	3
Lowell, Mass.	35	27	7	1	-	-	4
Lynn, Mass.	10	7	2	1	-	-	2
New Bedford, Mass.	33	31	2	-	-	-	-
New Haven, Conn.	32	23	7	2	-	-	1
Providence, R.I.	69	42	15	7	1	4	-
Somerville, Mass.	3	3	-	-	-	-	-
Springfield, Mass.	50	35	9	4	-	2	7
Waterbury, Conn.	28	24	4	-	-	-	4
Worcester, Mass.	67	54	10	3	-	-	13
MID. ATLANTIC	2,272	1,585	419	195	28	44	146
Albany, N.Y.	49	37	4	3	3	2	4
Allentown, Pa.	22	18	4	-	-	-	-
Buffalo, N.Y.	61	47	10	3	1	-	3
Camden, N.J.	65	37	13	11	-	3	-
Elizabeth, N.J.	21	16	4	1	-	-	-
Erie, Pa.§	42	34	7	1	-	-	4
Jersey City, N.J.	47	27	6	9	1	4	2
New York City, N.Y.	1,246	840	251	123	13	19	68
Newark, N.J.	64	37	17	8	1	1	9
Paterson, N.J.	U	U	U	U	U	U	U
Philadelphia, Pa.	236	163	43	17	4	9	20
Pittsburgh, Pa.§	42	27	11	4	-	-	4
Reading, Pa.	9	9	-	-	-	-	-
Rochester, N.Y.	124	95	20	6	2	1	14
Schenectady, N.Y.	18	12	4	1	1	-	1
Scranton, Pa.§	39	34	3	2	-	-	2
Syracuse, N.Y.	116	95	16	2	2	1	9
Trenton, N.J.	23	14	2	4	-	3	2
Utica, N.Y.	22	18	3	-	-	1	2
Yonkers, N.Y.	26	25	1	-	-	-	2
E.N. CENTRAL	2,281	1,562	405	185	51	75	121
Akron, Ohio	57	44	8	3	-	2	-
Canton, Ohio	48	38	8	1	-	1	1
Chicago, Ill.	489	301	91	44	15	35	44
Cincinnati, Ohio	155	103	29	14	4	5	11
Cleveland, Ohio	165	112	33	13	2	5	6
Columbus, Ohio	188	124	39	16	5	4	7
Dayton, Ohio	127	85	33	8	1	-	7
Detroit, Mich.	216	140	43	24	7	2	6
Evansville, Ind.	54	45	7	-	-	2	3
Fort Wayne, Ind.	63	46	9	4	4	-	2
Gary, Ind.	11	8	3	-	-	-	-
Grand Rapids, Mich.	52	37	4	4	1	6	1
Indianapolis, Ind.	178	108	36	22	5	7	-
Lansing, Mich.	43	37	6	-	-	-	3
Milwaukee, Wis.	138	99	18	17	-	4	8
Peoria, Ill.	44	39	1	2	1	1	2
Rockford, Ill.	50	38	7	4	1	-	6
South Bend, Ind.	41	31	6	3	1	-	4
Toledo, Ohio	100	76	15	5	4	-	6
Youngstown, Ohio	62	51	9	1	-	1	4
W.N. CENTRAL	817	576	140	51	15	22	43
Des Moines, Iowa	74	54	13	5	-	2	5
Duluth, Minn.	28	21	4	2	1	-	1
Kansas City, Kans.	27	17	6	4	-	-	-
Kansas City, Mo.	116	73	18	5	3	4	9
Lincoln, Nebr.	47	31	12	4	-	-	5
Minneapolis, Minn.	194	141	29	9	5	10	13
Omaha, Nebr.	84	55	18	6	1	4	6
St. Louis, Mo.	104	73	17	11	2	1	2
St. Paul, Minn.	46	35	9	2	-	-	1
Wichita, Kans.	97	76	14	3	3	1	1

Reporting Area	All Causes, By Age (Years)						P&I† Total
	All Ages	>65	45-64	25-44	1-24	<1	
S. ATLANTIC	1,359	873	291	142	35	17	89
Atlanta, Ga.	215	135	49	24	7	-	4
Baltimore, Md.	208	131	39	29	6	3	24
Charlotte, N.C.	91	64	18	6	1	2	3
Jacksonville, Fla.	148	84	42	18	2	1	5
Miami, Fla.	99	65	21	10	2	1	-
Norfolk, Va.	63	40	13	5	-	5	4
Richmond, Va.	93	64	16	11	2	-	12
Savannah, Ga.	52	36	8	7	1	-	7
St. Petersburg, Fla.	59	51	5	2	-	1	5
Tampa, Fla.	174	126	31	12	3	2	20
Washington, D.C.	147	75	44	18	8	2	5
Wilmington, Del.	10	2	5	-	3	-	-
E.S. CENTRAL	598	404	126	46	12	10	52
Birmingham, Ala.	U	U	U	U	U	U	U
Chattanooga, Tenn.	72	58	9	3	-	2	6
Knoxville, Tenn.	120	83	24	13	-	-	17
Lexington, Ky.	62	35	21	3	1	2	4
Memphis, Tenn.	U	U	U	U	U	U	U
Mobile, Ala.	90	65	13	7	4	1	2
Montgomery, Ala.	47	36	6	4	-	1	7
Nashville, Tenn.	207	127	53	16	7	4	16
W.S. CENTRAL	1,594	1,086	305	120	33	36	105
Austin, Tex.	86	55	14	13	3	1	5
Baton Rouge, La.	46	32	7	6	1	-	2
Corpus Christi, Tex.	56	41	11	3	1	-	2
Dallas, Tex.	245	154	58	18	7	8	2
El Paso, Tex.	95	59	12	7	2	1	11
Ft. Worth, Tex.	112	80	22	5	4	1	11
Houston, Tex.	314	198	68	35	5	8	35
Little Rock, Ark.	108	73	24	5	1	5	9
New Orleans, La.	90	68	19	2	1	-	-
San Antonio, Tex.	252	189	32	17	8	6	18
Shreveport, La.	79	64	9	3	-	3	8
Tulsa, Okla.	111	73	29	6	-	3	2
MOUNTAIN	1,034	713	192	75	26	26	100
Albuquerque, N.M.	119	82	17	14	5	1	3
Boise, Idaho	26	19	7	-	-	-	3
Colo. Springs, Colo.	63	44	12	4	2	1	9
Denver, Colo.	124	81	22	8	4	9	13
Las Vegas, Nev.	192	130	43	11	3	3	19
Ogden, Utah	27	19	7	-	1	-	2
Phoenix, Ariz.	181	109	41	20	4	7	17
Pueblo, Colo.	37	29	5	2	-	1	5
Salt Lake City, Utah	106	82	12	7	5	-	11
Tucson, Ariz.	159	118	26	9	2	4	18
PACIFIC	1,652	1,204	284	105	34	25	167
Berkeley, Calif.	22	19	1	1	-	1	2
Fresno, Calif.	98	69	13	7	6	3	11
Glendale, Calif.	21	15	4	1	1	-	2
Honolulu, Hawaii	76	57	12	5	2	-	10
Long Beach, Calif.	67	44	16	5	1	1	9
Los Angeles, Calif.	394	299	57	26	7	5	22
Pasadena, Calif.	29	21	5	1	-	2	3
Portland, Oreg.	124	96	23	5	-	-	5
Sacramento, Calif.	U	U	U	U	U	U	U
San Diego, Calif.	149	98	27	15	5	4	30
San Francisco, Calif.	100	71	18	8	3	-	17
San Jose, Calif.	236	169	46	13	3	5	32
Santa Cruz, Calif.	36	31	3	2	-	-	7
Seattle, Wash.	135	93	29	6	4	3	7
Spokane, Wash.	59	41	11	4	2	1	4
Tacoma, Wash.	106	81	19	6	-	-	6
TOTAL	12,285¶	8,483	2,293	961	240	273	880

U: Unavailable -: no reported cases

*Mortality data in this table are voluntarily reported from 122 cities in the United States, most of which have populations of 100,000 or more. A death is reported by the place of its occurrence and by the week that the death certificate was filed. Fetal deaths are not included.

†Pneumonia and influenza.

§Because of changes in reporting methods in this Pennsylvania city, these numbers are partial counts for the current week. Complete counts will be available in 4 to 6 weeks.

¶Total includes unknown ages.

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